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SECTOR COMPETITIVENESS FRAMEWORKS

PETROLEUM PRODUCTS

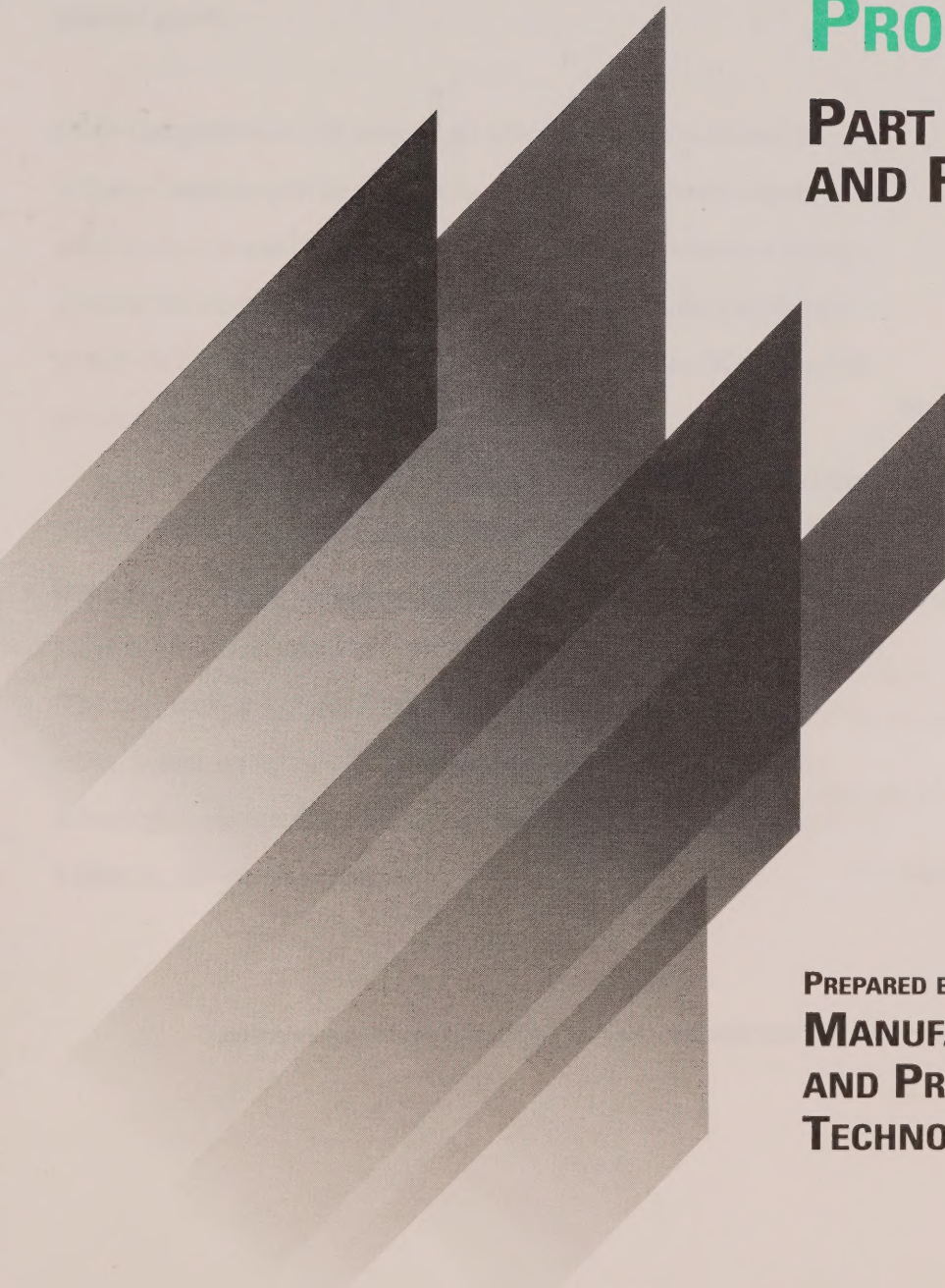
PART 1 – OVERVIEW AND PROSPECTS



**Industry
Sector**
Manufacturing
and Processing
Technologies

**Secteur
de l'industrie**
Technologies
de fabrication et
de transformation

Canada



PETROLEUM PRODUCTS

PART 1 — OVERVIEW AND PROSPECTS

PREPARED BY:
**MANUFACTURING
AND PROCESSING
TECHNOLOGIES BRANCH**

This *Overview and Prospects* is the first of two companion documents on Petroleum Products in the **Sector Competitiveness Frameworks** series, which is being produced by Industry Canada in partnership with Canada's key stakeholders in the industry. *Part 2 — Framework for Action* will be prepared in coming months, based on consultations with major industry stakeholders, following study and review of the *Overview and Prospects*.

The **Sector Competitiveness Frameworks** series will focus on the opportunities, both domestic and international, as well as on the challenges facing each sector. The objective is to seek ways in which government and private industry together can strengthen Canada's competitiveness and, in doing so, generate jobs and growth.

In all, some 29 industrial sectors will be analyzed. *Part 1 — Overview and Prospects* will be available for distribution in printed as well as electronic forms during coming months for the following industries:

Aircraft and Aircraft Parts
Automotive Industry
Bus Manufacturing
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FOREWORD

The new Canadian marketplace is expanding from national to global horizons and its economic base is shifting increasingly from resources to knowledge. These trends are causing Canadian industries to readjust their business approaches, and government must respond with new tools to help them adapt and innovate. Industry Canada is moving forward with strategic information products and services in support of this industry reorientation. The goal is to aid the private sector in what it is best qualified to do — create jobs and growth.

Sector Competitiveness Frameworks are a series of studies published by Industry Canada to provide more focussed, timely and relevant expertise about businesses and industries. They identify sectors or subsectors having potential for increased exports and other opportunities leading to jobs and growth. In 1996–97, they will cover 29 of Canada's key manufacturing and service sectors.

While they deal with “nuts and bolts” issues affecting individual sectors, the Sector Competitiveness Frameworks also provide comprehensive analyses of policy issues cutting across all sectors. These issues include investment and financing, trade and export strategies, technological innovation and adaptation, human resources, the environment and sustainable development. A thorough understanding of how to capitalize on these issues is essential for a dynamic, job-creating economy.

Both government and the private sector must develop and perfect the ability to address competitive challenges and respond to opportunities. The Sector Competitiveness Frameworks illustrate how government and industry can commit to mutually beneficial goals and actions.

The Sector Competitiveness Frameworks are being published sequentially in two parts. An initial *Overview and Prospects* document profiles each sector in turn, examining trends and prospects. The follow-up *Framework for Action* draws upon consultations and input arising from industry— government collaboration, and identifies immediate to medium-term steps that both can take to improve sectoral competitiveness.

The Sector Competitiveness Frameworks study of the Petroleum Products industry was conducted in full partnership with the industry, other federal departments and consumers. The industry was represented by the Canadian Petroleum Products Institute and several of its member companies. The other federal government departments included Natural Resources Canada (regarding the petroleum industry's technology and markets) and Environment Canada (regarding the environmental requirements). The perspective of the Canadian consumer was provided by a member of the Canadian Consumers Association. This *Overview and Prospects* document summarizes and updates the original analysis and findings of the partnership.

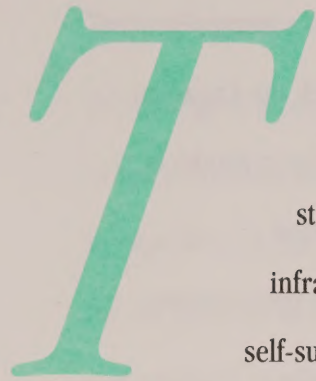
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he petroleum products industry is a strategic component of Canada's industrial infrastructure. Canadians currently enjoy self-sufficiency in petroleum products, which are expected to be the fuel of choice for consumers well into the 21st century. The industry is capital-intensive and highly competitive, with a strong domestic focus. It comprises two subsectors: refining and marketing.

Petroleum products are the fuel source for virtually all transportation in Canada and provide critical feedstock supplies to other major industry sectors. The industry is a critical source of revenue for governments, collecting about \$9 billion annually in federal and provincial taxes on gasoline alone. Some 105 000 people are employed, and revenues of \$25 billion were generated in 1994. The refinery work force is highly educated and generates one of the highest levels of value-added in Canadian manufacturing.

The exploration, extraction and processing of natural resources has traditionally been the foundation on which the Canadian economy has been built. The Canadian petroleum products industry continues to provide an important basis for this country's wealth and security, even as the economy diversifies into other sectors.

Trade

Canada is a net exporter of petroleum products, with a positive trade balance of \$1.0 billion in 1994 and \$1.2 billion in 1995. Canada's trade surplus with the United States was \$1.5 billion in 1994 and \$1.6 billion in 1995. In 1995, Canada exported some 40 000 cubic metres per day, compared with 23 000 cubic metres imported. Almost all product exports go to the U.S. market, with the majority originating in Canada's Atlantic refineries.

Technology

Technology is a concern in the extraction and production arm of the petroleum industry, where techniques must be adapted to capitalize on the latest technological advances. However, for the purpose of this document, which deals with the refining and products marketing side, technology has attained a certain level of maturity and, except for occasional updates, no major breakthroughs are anticipated.

Human Resources

Of the more than 105 000 people employed in the petroleum industry, approximately 10 900 are in refineries and the remainder are in products distribution and marketing operations. The refinery work force has one of the highest levels of value-added in Canadian manufacturing, at about \$196 000 of value-added per employee. In general, refinery jobs are high in skills and knowledge requirements.

Investment

Petroleum refining is a highly capital-intensive industry, requiring 8.0 units of capital for every unit of value-added output. This far outweighs the average capital intensity for all manufacturing industries of 2.6. In each of 1993 and 1994, capital expenditures in refining and marketing were approximately \$400 million, for a total of \$800 million.

1.1 Major Trends

Evolution of the Market

Although the industry anticipates little or no growth in the overall demand for petroleum products over the next several years, a modest growth in diesel and aviation fuels is expected. However, there may well be an attendant decline in demand for motor gasoline due to improved fuel efficiencies in the Canadian vehicle fleet.

The refining industry must remain competitive in the global market by optimizing the utilization of its asset base and continuing to emphasize cost control and industry rationalization. Ultimately, the industry must be prepared to deliver products that can compete with readily available imports. In addition, the petroleum products sector will continue to seek out new markets and increase market penetration into certain areas of the U.S.

Ontario refiners are at the end of the Interprovincial Pipe Line system, and are therefore vulnerable to higher acquisition costs for western Canadian crude. They are currently evaluating the feasibility of reversing the direction of flow in the Sarnia-to-Montreal pipeline in the near future. This would allow greater flexibility for Ontario refineries to access imported crude and thus seek the most economical source of crude. The potential impacts of this decision, particularly with regard to the impact on Ontario refiners and western crude producers, must be carefully analyzed.

Restructuring

The industry has already undergone major restructuring necessitated by long-term declines in demand coupled with intense competition in the marketplace. The number of refineries has dropped from 40 in the early 1980s to 21 in 1995. The industry must continue to control operating and feedstock costs in order to maintain competitive margins with the United States. Also, crude oil acquisition costs continue to be an issue, since Canadian processing capability, which is complex by global standards, still lags the U.S. with respect to the processing of cheaper, heavier crudes. Necessary adjustments in this respect will help meet competition from U.S. refiners, while maintaining healthy profit margins. Industry Canada will work with industry and other stakeholders to ensure that further rationalization enhances the competitiveness of Canada's petroleum industry, while keeping competition healthy among domestic refiners.

Pricing and Retail End Rationalization

Approximately 75 percent of refining and marketing revenues in Canada is absorbed by crude costs and excise taxes. The remaining 25 percent covers operating costs (15 percent), labour and income taxes (7 percent), leaving 3 percent for profits. Canadian marketing margins are considered low relative to those in the U.S. Although it is difficult to compare retail margins with operating costs because of the rapid and still ongoing decline in the number of service stations in Canada, it seems that revenue shortfalls are not uncommon, particularly in southern Ontario. Rationalization of the retailing sector may have to continue, since there are twice as many service stations in Canada in proportion to population as there are in the United States. With relatively low retail margins on gasoline, Canadian retail operators have had to turn to secondary sources of income such as convenience stores, car washes, etc., in order to remain viable. A problem here is high exit barriers, reflected in the site clean-up costs for unprofitable gasoline retail operations. Industry Canada will work with industry stakeholders to achieve more rationalization while striving to minimize the impact on competition and job creation in the retail sector.

Sustainable Development

Environment Canada and the Canadian Petroleum Products Institute (CPPI) have recently developed scenarios for the anticipated environmental requirements for the Canadian refinery industry over the next two decades. The costs associated with these projected scenarios are high, and present major challenges for the industry. The most pressing environmental challenges over the next decade concern the need to produce more environmentally friendly transportation fuels (i.e. reformulated gasoline and diesel fuels). Even though technology exists for producing highly reformulated fuels, the investment costs are high; the health and environmental benefits must be carefully weighed against these costs to ensure cost effectiveness.

The challenge also exists to continue to respond to technological changes in the automotive industry that require compatibility between transportation fuels and vehicle engine technology. Significant improvements in engine performance and emission levels have been made over the past 20 years: carbon monoxide (CO) and hydrocarbon (HC) levels are down by 96 percent,

and nitrogen oxide (NO_x) is down 76 percent, but there remains more scope for improvements through joint efforts between the two industries.

As part of its agenda to ease and simplify the regulatory impact on business, Industry Canada is involved in discussions with the industry and other stakeholders. The objective is to allow the industry to recover incremental costs while the consumer continues to receive low-cost, high-quality, environmentally safe products. This strategy may entail joint priority setting between government and industry to ensure that environmental regulations are based on a scientifically sound agenda that allows for industry competitiveness and affordability. Consideration will be given to review of the rates of return assigned to regulated industries in Canada, particularly pipelines and electrical utilities, which impact upon the profitability of the petroleum products industry.

These and other issues will be subject to consultations between Industry Canada, the petroleum products industry and other stakeholders, and will be addressed in the upcoming *Framework for Action* document.

2 KEY POINTS ABOUT THIS INDUSTRY

The exploration, extraction and processing of natural resources has traditionally been the foundation on which the Canadian economy has been built. The Canadian petroleum products industry continues to provide an important basis for this country's wealth, even as the economy diversifies into other sectors.

The petroleum products industry represents the “downstream” (i.e. refining and products marketing) portion of the oil industry. It includes those companies that refine crude oil into petroleum products, transport them to distribution storage terminals and sell them directly to major users or through wholesale and retail outlets to individual consumers. The “upstream” (i.e. extraction and production) segment of the oil industry is engaged in the exploration and production of crude oil and natural gas for delivery to pipelines and refineries. The downstream segment operates independently from the upstream sector of the petroleum industry.

**“Downstream” portion
of oil industry refines,
transports, wholesales
and retails petroleum
products . . .**

**... mainly for
transportation, heating
and industrial uses**

Crude oil is refined into a variety of different petroleum products, principally motor gasoline, diesel fuel, aviation fuel, light and heavy fuel oil, and other products such as lubricating oils and greases, asphalt and petrochemical feedstocks. While these products are used for a number of industrial, commercial and residential purposes, they are primarily intended for the transportation sector.

Statistics Canada defines the petroleum products industry for the purposes of compiling data according to 1980 Standard Industrial Classification (SIC) codes 3610, Refined Petroleum Industries, and 3690, Coal Products Industries, which include virtually all refined petroleum products.

**Weak demand growth
and increasing capital
expenditures drive need
to improve productivity**

The petroleum refining and marketing industry is a critically important component of the Canadian economy. However, in the current economic environment, demand growth is likely to be weak, major capital expenditures will continue to increase and profitability must be improved. Faced with these challenges, joint dialogue and cooperation among government, industry and consumers will be crucial to preserve the future viability of this strategic infrastructure industry for the Canadian economy.

2.1 Global Context

The petroleum industry is a truly global industry in which both crude oil and refined petroleum products are traded around the world by tanker and pipeline as international commodities. It is a highly competitive industry, and producers and refiners must operate within a global cost and pricing structure in order to survive.

The demand for crude and refined products has remained relatively steady among member countries of the Organisation for Economic Co-operation and Development for several years. Their economies have become less energy-intensive, and growth has slowed since the 1960s and 1970s. But energy demand, notably petroleum, continues to increase among the newly industrialized countries (NICs), particularly in Asia.

2.2 North American Context

The cost and pricing structure of the international oil market directly affects all North American crude producers and refiners because of the potential for imports to replace domestic crude and/or products. Canadian and U.S. refiners must therefore ensure that the price of their products is competitive with offshore imports. This necessitates a continuous effort to trim costs in order to create an adequate profit margin for reinvestment and return to investors.

Petroleum cost and pricing structure is set globally

Energy demand is steady in developed world, increasing in NICs

Canada and U.S. firms compete fiercely in integrated NA market

North America is an integrated market for crude oil and refined products. There is robust cross-border trade of these largely undifferentiated products, rendering each other's market sensitive to fiercely competitive pricing and marketing efforts. Pipelines, rail and trucking allow ready access by Canadian and American exporters to each other's markets. Canada is self-sufficient in both crude oil and refined product production, and enjoys a trade surplus with the United States. The U.S., on the other hand, is dependent on foreign supply to meet its demand requirements for crude and refined products. Canadian crude oil production far exceeds domestic demand, which is a significant strategic advantage for Canada. For example, Canada exported over 40 percent of its light crude production and 70 percent of its heavy crude production to the U.S. during 1993, 1994 and 1995.

2.3 Canadian Context

**Petroleum products
industry is heavily
integrated into
Canadian economy**

Both the upstream and downstream segments of the oil business in Canada date back to the early part of this century. The industry has since become a major creator of jobs and wealth in Canada. The petroleum products industry is a strategic infrastructure industry in as much as it provides critical feedstock supplies to other major industry sectors, particularly petrochemicals. Over 64 percent of all petroleum products in Canada is used as inputs to other businesses, such as the transportation industry, power utilities, chemical and chemical product manufacturers, agriculture, mining and others. In addition, the industry provides fuels for virtually all transportation modes.

The petroleum products industry is a mature industry in Canada. Demand has shown little growth for several years, and margins and profitability have been relatively low. For example, domestic demand for petroleum products increased by an average of 1.6 percent from 1991 to 1995, after experiencing a loss of 5.9 percent from 1990 to 1991. The net result was recovery of 1990 levels by 1995. Also, profitability improved from a loss of 2.8 percent return on capital employed in 1991 to a gain of 6.6 percent in 1994. These improvements have occurred because the industry has responded by cutting costs through downsizing and rationalization while reinvesting in more efficient processes and technology.

2.4 Canadian Regional Context

The Canadian petroleum products industry operates in three distinct geographic markets, namely the Atlantic provinces and Quebec, Ontario and western Canada. The regions are distinguished by different competitiveness forces, such as the sources of crude oil supply (i.e. imports versus domestic supply), markets (i.e. domestic versus export markets) and sensitivity to product imports.

Industry seeks profitability through downsizing, rationalizing, more efficient technology

Three petroleum regions: Atlantic and Quebec, Ontario and West

Western Canada supplies**crude oil from B.C. to****Ontario, eastern Canada****imports foreign oil****Crude Oil**

There are three main sources of crude oil for domestic refineries:

- Western Canada, mainly Alberta and Saskatchewan, supplies central Canada through the Interprovincial Pipe Line (IPL) system and, to a much lesser extent, supplies British Columbia through the Trans Mountain Pipe Line.
- Offshore imports reach Canada through Maine via the Portland–Montreal Pipe Line to Montreal refineries.
- Other offshore imports reach Quebec City via the St. Lawrence Seaway and reach Atlantic refineries through the Atlantic ports.

Western Canadian crude is able to reach the Canadian refineries from British Columbia to Ontario economically. With the exception of the Sarnia-to-Montreal pipeline (IPL Line 9), the pipeline infrastructure for western Canadian crude to reach refiners in Quebec and Atlantic Canada does not exist. Even if it did exist, it would probably be less expensive to import foreign crude to these locations. As a result, eastern Canadian refineries depend largely on imported crude supplies.

Although Ontario refineries rely mainly on western Canadian crude oil, they can also import crude from the U.S. or through the U.S. Gulf Coast (en route from offshore sources). Discussions are under way to reverse the Sarnia-to-Montreal pipeline to allow imported crude to be shipped from Portland and Montreal into Ontario, which would increase the supply flexibility of Ontario refineries.

**Foreign crude oil also
reaches Ontario**

Canadian light crude (Alberta Mixed Blend) competes against other light crude at Chicago, including West Texas Intermediate and North Sea crude (i.e. Brent). Canadian heavy crude also competes with imported heavy crude at Chicago: Cold Lake Blend competes with imports of heavy Maya crude from Mexico.

Refined Products

Refinery economics vary widely by region. In Atlantic Canada and Quebec, refineries enjoy access to marine transportation of crude oil and petroleum products. Atlantic refineries produce more than their domestic product needs and are therefore much more geared to export markets (in the northeastern

U.S. and Europe) than refiners in other regions of Canada. In Ontario, refineries compete with large northern U.S. refineries on incremental products imported by Canadian independent distributors. Eastern Canada and British Columbia refineries are under the most competitive international pressure from offshore products. In landlocked western Canada, as a result of refinery closures and rationalization of operations, refinery capacity and therefore production is now well balanced with consumer demand. Consequently, levels of product imports are minor.

Two centres, Sarnia and Edmonton, offer a critical mass of refining, chemical and petrochemical plants to support a dynamic and healthy infrastructure of suppliers, contractors and community services to make these centres of efficiency. The Montreal area, however, appears to have slipped below this critical mass in recent years.

2.5 Canadian Industry Snapshot

The petroleum refining and marketing industry has been a vital component of the Canadian economy for most of this century, producing \$15.8 billion worth of commodities in 1989, or 0.4 percent of manufacturing gross domestic product (GDP). In 1993 and 1994, the industry contributed 1 percent of the manufacturing sector GDP.

Changing social, economic and environmental conditions have challenged the industry in recent years. From a rapid growth in the 1970s, demand declined drastically in the following decade, mainly because of the effects of the National Energy Program (which was discontinued in the mid-1980s) and energy conservation efforts fuelled by high oil prices in the 1970s. Since 1982, the petroleum refining industry has been confronted with higher unit production costs and lower profits generated by declining demand for refined products and low refinery utilization rates. Beginning in 1992, the industry has seen marginal recovery in product demand and significantly improved profitability as a result of severe cost cutting (by 18 percent or \$800 million since 1991, according to industry sources), rationalization of facilities and downsizing.

Industry has cut costs by
18% since 1992

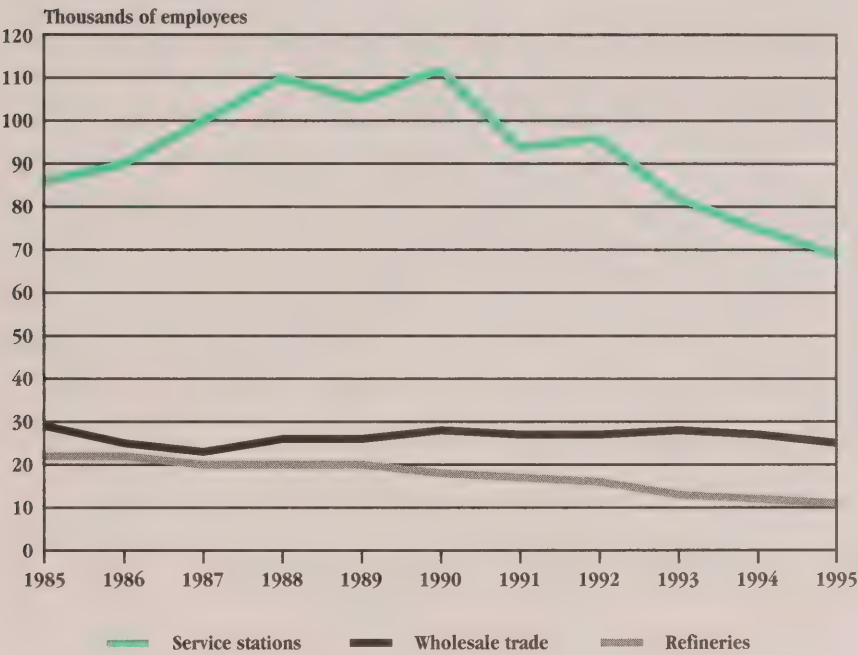
The largest companies own and operate refineries as well as marketing networks across the country. These “integrated” companies operate in both the upstream and downstream segments of the industry. A second group of firms are regional refiner/marketers; these companies are not necessarily integrated. The third group of companies — by far the largest number — do not refine crude oil and are involved only in marketing products in local or regional markets. These companies are considered the “independents.”

- In the refining segment, 13 companies own and operate 21 refineries in eight provinces and one territory.
- In the distribution segment, all the refiners and some independent companies operate storage terminals and ship refined products to wholesale and retail outlets.
- In the retailing segment, the “integrateds” and the “regional refiners” are joined in competition by the large number of independents that operate their own networks of retail outlets, usually in urban markets, where the sales volumes are higher than in rural areas.

The petroleum products sector directly employed approximately 105 000 people across Canada in 1995. Specifically, 10 900 people (compared with 22 500 in 1985) were employed in the manufacturing segment of the industry, 69 000 (compared with 85 700 in 1985) were employed in the retail marketing and distribution segment, and 25 100 (compared with approximately 28 600 in 1985) were employed in wholesale distribution (Figure 1).

The sector employs
105 000 – 20 000
fewer than in 1982

Figure 1. Petroleum Products Industry Employment



Source: Statistics Canada, Catalogue No. 57-601, annual.

Refinery employees, when compared with employees in other industrial sectors, rank very high in knowledge intensity, according to Statistics Canada Census Data for the 1986–91 period. The survey ranked knowledge intensity in three categories: high for jobs requiring a university degree, medium for jobs requiring other postsecondary certificates and low for jobs requiring secondary school diplomas or no diploma. Using a point system of 2, 1 and 0 points, respectively, for high, medium and low intensity and averaging the result over the work force, the refinery work force knowledge intensity score was 0.49. The average for all manufacturing was 0.285. Only the electrical and electronic sector scored higher, with a score of 0.5.

**Double the U.S. per capita
number of service
stations compete for
Canada's business**

In the marketing segment of the industry, Canada operates twice the number of service stations per capita as the U.S., despite closures over the past decade. In 1994, there were 17 000 stations, down from 24 100 in 1980. Sales volumes per station in Canada were about half (5300 litres per day) of U.S. volumes (10 000 litres per day) in 1994. To maximize the use of assets and generate increased margins, alternate sources of income, such as car washes and convenience stores, have been established at retail outlets.

The three largest refining companies (Imperial Oil Limited, Petro-Canada and Shell Canada Limited), control about 56 percent of refining capacity. The other 44 percent is controlled by 10 regional refiners (Irving Oil, Ultramar Canada Inc., Novacor Chemicals (Canada) Inc., Newfoundland Processing Limited, Suncor Inc., Husky Oil Operations Limited, Chevron Canada Limited, Consumers' Cooperative Refineries Limited, Saskatchewan Asphalt and Parkland Industries Limited).

Imperial, Petro-Canada and Shell control 56% of refining capacity

According to estimates by Natural Resources Canada, 44 percent of refinery capacity in this country is Canadian-owned. Approximately 35 percent is U.S.-owned, and 21 percent has foreign ownership, primarily European. Independent businesses own 44 percent of retail outlets.

Canadians own 44% of refineries, and independent Canadian businesses own 44% of retail outlets

Revenues and Profitability

Petroleum products industry revenues (net of excise, sales and other taxes) have remained relatively stable over the past decade. In 1994, the industry generated \$25 billion in revenues, which represents a slight increase of \$650 million (3 percent) over the 1993 level.

1994 revenues at \$25B climbed 3% over 1993 ...

for a net profit of \$1B

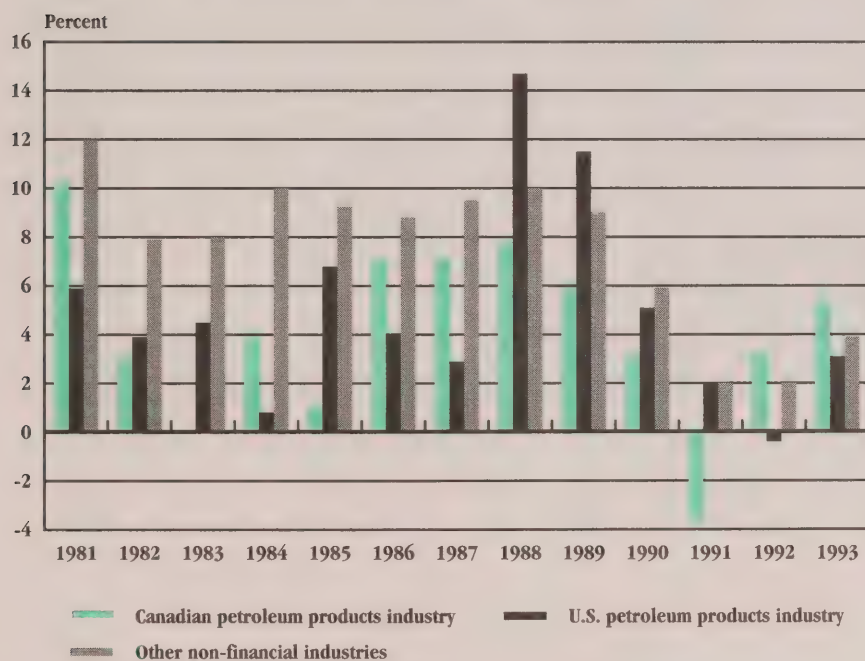
The industry in 1994 generated a net profit of approximately \$1 billion, or 1 cent for every litre of petroleum product sold.

The industry improved its financial performance in terms of net income since 1993, after several years of less than average rates of return. Following a loss of \$637 million in 1991 as a result of the buildup of high-cost crude inventories during the Gulf War, which were not recovered in the marketplace, net income has made significant gains. After-tax profit for the industry was up 84 percent from \$220 million during the first half of 1993 to \$405 million for the same period in 1994.

Hence, following several years of low rates of return on capital employed (ROCE), the industry recorded a significant improvement in 1994. An ROCE of 6.6 percent was shown, compared with a 1993 rate of 5.3 percent (Figure 2). The 1994 return is higher than the 10-year petroleum products industry average of 4.6 percent and the U.S. 10-year average of 5.5 percent, and is equivalent to the 10-year average for Canada's non-financial sector.

**Return on capital
employed improved
more than 1% in 1994**

Figure 2. Rate of Return on Capital Employed in the Canadian Petroleum Products Industry



Source: Purvin & Gurtz Inc., *EIA Performance Profiles*, Natural Resources Canada, 1994.

**Half of pump price of
gasoline is tax —
\$9B in 1994**

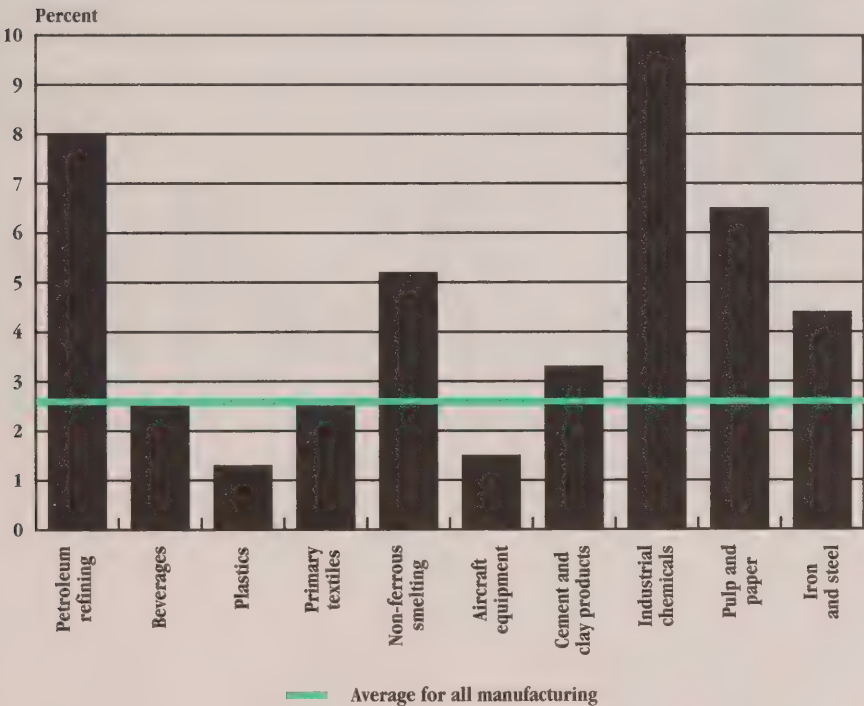
Of the average price of 54.8 cents per litre for regular unleaded gasoline in Canada in 1995, over one half was the tax component. As a result, the federal and provincial governments collected over \$9 billion in 1995 in consumption taxes on gasoline alone.

Capital Intensiveness

The petroleum products industry is extremely capital-intensive, and therefore requires continued high levels of capital investment to renew its technology. The capital intensiveness or capital-output ratio of an industry can be measured by determining the ratio of capital invested to the industry's GDP. This is calculated by dividing undepreciated capital stock by GDP.

Capital intensiveness measures the capital stock per unit of value-added. For example, there are 8.0 dollars of capital in the petroleum products industry for every dollar of value-added (Figure 3). This figure compares with an average of 2.6 dollars of capital for every dollar of value-added in other manufacturing industries.

Figure 3. Capital Intensiveness in Canadian Manufacturing, 1993



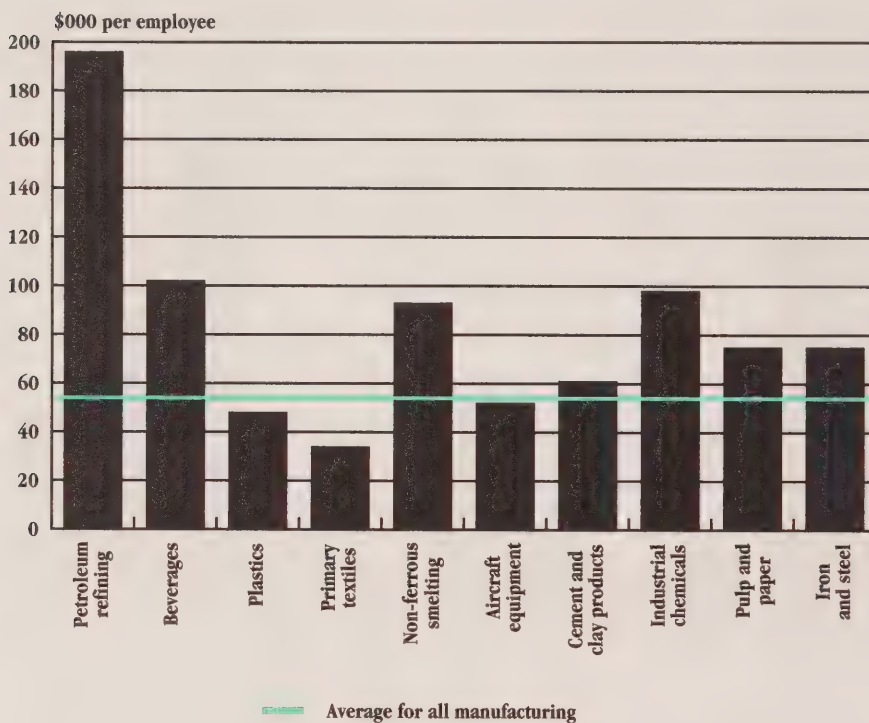
Source: Informetrica Limited, 1995.

**Productivity per refinery
employee trebles that
of manufacturing
sector average**

Productivity

Value-added per refinery employee is about \$196 000, compared with \$55 000 per worker for all manufacturing (Figure 4).

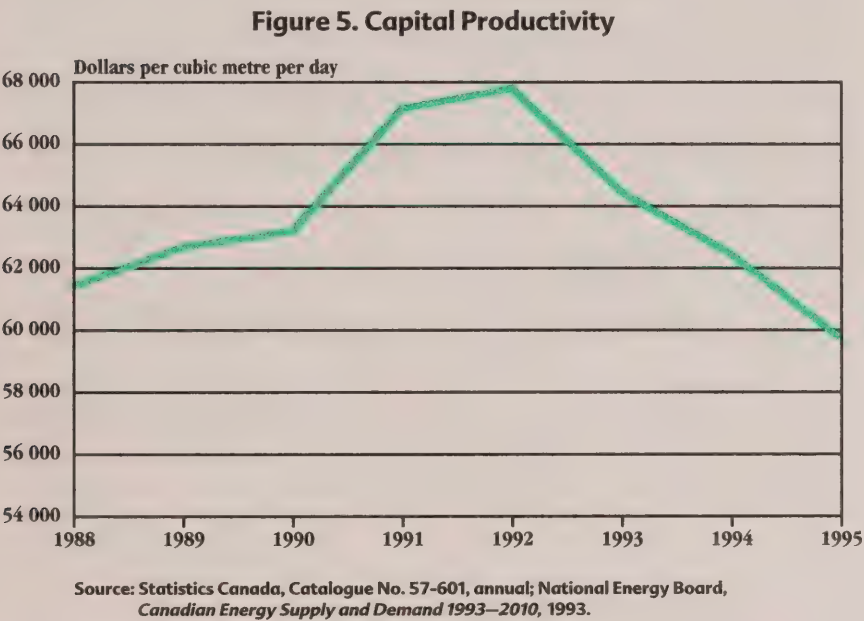
Figure 4. Labour Productivity in Canadian Manufacturing, 1993



Source: Informetrica Limited, 1995.

The ratio of capital stock (i.e value of refinery assets in constant 1986 dollars, which includes machinery, equipment and structures) to refinery daily output represents the industry’s capital productivity. Since 1988, capital productivity has averaged approximately \$63 500 per cubic metre per day of production (Figure 5).

Ratio of capital stock
to refinery output
remains steady



**Keeping 21 Canadian
refineries competitive
meant closing 19**

Refinery Utilization

North American refineries must operate at approximately 85 percent of crude capacity in order to maintain adequate profitability. The industry has had to rationalize its refining operations in order to improve its utilization rate. In 1994, some 21 refineries were operating in Canada, down from 40 in the early 1980s. This restructuring, combined with a slight increase in product demand, enabled the industry to increase its average utilization rates to 87 percent in 1994 and to 85 percent in 1995 (Figure 6).

Figure 6. Refinery Utilization Rates



Source: Natural Resources Canada, Oil Division, 1994.

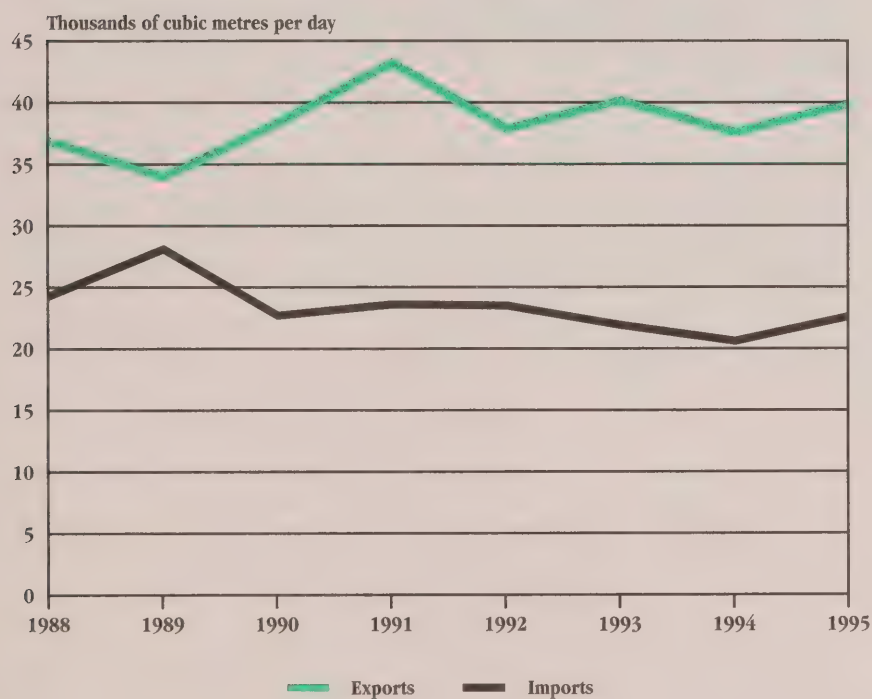
Trade

Canada is a net exporter of petroleum products (Figure 7). It had a positive world trade balance of \$1.0 billion in 1994 and a balance of \$1.2 billion in 1995. Canada's trade surplus with the U.S. was \$1.5 billion in 1994 and \$1.6 billion in 1995. In 1995, Canada exported some 40 000 cubic metres per day, compared with 23 000 cubic metres imported. Almost all product exports go to the U.S. market, with the majority originating in Canada's Atlantic refineries. Most Canadian product imports from the U.S. enter into the Quebec and Ontario markets.

Canada exported

\$1.2B (net) in 1995

**Figure 7. Canadian Petroleum Products Industry
Imports and Exports**



Source: Statistics Canada, Catalogue No. 57-601, annual.

3 CHANGING CONDITIONS AND INDUSTRY RESPONSE

3.1 Refining

Profitability

**Rates of return assigned
to regulated industries
(pipelines and electrical
utilities) affect petroleum
industry profits**

In the past decade, the petroleum products industry has managed to improve its profitability — and attract capital — through cost cutting, rationalization and downsizing in the refining segment. There is continuing pressure on the industry to establish more efficient facilities, to increase refinery complexity and computerization, to respond to new environmental requirements and to meet new fuel specifications. All of these activities require high levels of capital investment.

While the industry's cost-cutting efforts have improved profitability, some costs remain beyond their direct control. Noteworthy among these costs are those arising from regulated industries such as pipelines and electric power utilities. Analysis shows that these costs can represent about 16 percent of non-capital operating costs for a refinery. Pipelines, for example, earn a rate of return that has averaged over 14 percent in recent years. Recent regulatory initiatives to encourage greater efficiencies and incentives may help to address this problem.

Refinery margins are heavily influenced by access to low-cost feedstocks, the ability of a refinery to process lower-cost heavy sour crude (refining complexity), economies of scale and control of operating costs. In addition, Canadian refineries are price takers for both crude purchases and product sales. The Canadian refining industry is largely based on light, sweet crude oil feedstocks, particularly in Ontario, where it has to compete with northern U.S. refineries that have considerable heavy crude coking capabilities, allowing them to run cheaper crude. Rationalization has increased the average size of Canadian refineries to a more competitive scale with northern U.S. plants.

“The major variable in the operating performance of the refinery is the quality of feedstock.”

**— Parkland Industries,
Annual Report, 1995**

Profitability in the petroleum products industry is a function of its margins, of which there are two types. The refining margin measures the difference between the refinery's crude costs (i.e. inputs) and the value of the products (i.e. outputs) at the refinery gate. The retail margin measures the difference between the refinery gate price (usually taken to be the wholesale rack price) and the pump price (net of tax) at the service station. The industry's gross margin is the sum of the refining and retail margins. Profitability is the gross margin less operating costs, labour costs and income taxes.

Rationalization

The petroleum products industry has undergone extensive rationalization to reduce costs, cut excess capacity and improve rates of return. This restructuring has been necessitated by long-term declines in demand coupled with intense competition in the marketplace. The net result has been to reduce the number of refineries by one half, from 40 to 21, since the early 1980s. This rationalization of refineries, combined with increased operating efficiencies, has resulted in a decline in refinery employment from 25 300 in 1982 to 10 900 in 1995.

Environmental Challenges

The industry has spent over \$2 billion on equipment, processes and procedures to protect the environment since the early 1970s. These initiatives include measures to reduce or eliminate contaminants in the effluent released from refineries, the reduction of sulphur emissions, site remediation, the phase-out of lead from gasoline, voluntary measures to reduce emissions of volatile organic compounds in ozone-sensitive areas, and the increased collection and recycling of used motor oil. Further initiatives currently being implemented include measures to reduce the level of sulphur in diesel fuel, manufacture reformulated gasoline, decontaminate the soil at service stations and refinery sites, and further reduce atmospheric emissions from facilities.

Fuel performance standards must meet automotive engine and pollution control specifications. Canada is currently developing national environmental fuel standards. Until such standards have been established by law, lower-quality fuels can be legally imported into Canada at prices that undercut Canadian products. This challenge to the industry’s competitiveness will be rectified following the adoption of national standards, which will place all refiners — domestic and offshore — on a level playing field in the Canadian market.

Since 1970s, the industry has spent more than \$2B on environmental protection

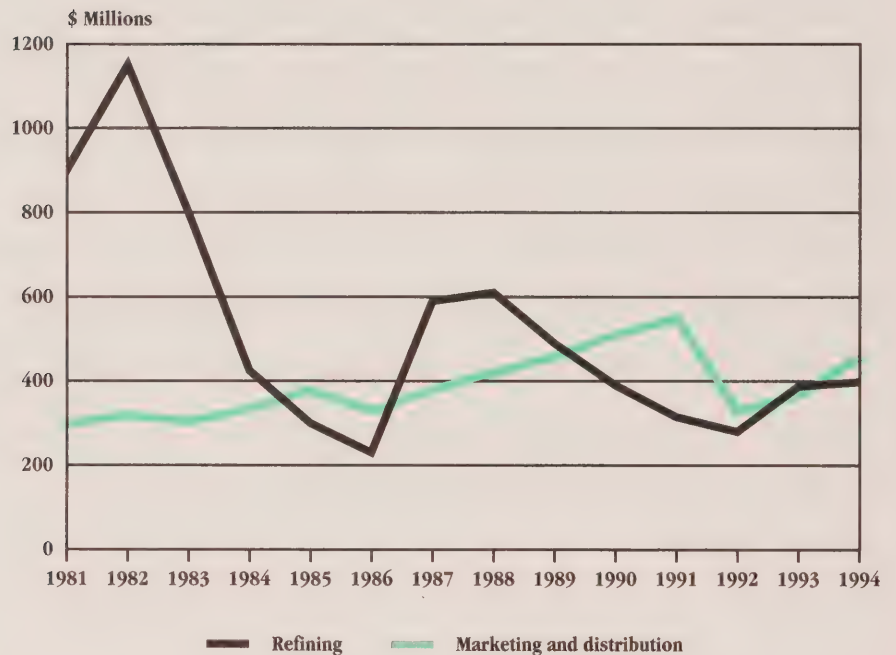
Lack of national fuel standards causes undercutting by foreign imports

Capital investment in
refining is steady at
\$400M per year

Capital Investments

The petroleum products industry requires extremely large capital investment simply to maintain productivity. After peaking at over \$1 billion in 1982 because of new plant construction, refinery investments (for capital expenditures) have averaged approximately \$400 million per year since the mid-1980s (Figure 8).

Figure 8. Capital Expenditures in the Canadian Petroleum Products Industry



Source: Natural Resources Canada, *Canadian Petroleum Industry Monitoring Reports*, annual.

Refining capital expenditures were \$388 million in 1993 and \$399 million in 1994. Similarly, capital expenditures in marketing and distribution were \$342 million during 1993 and \$436 million in 1994.

Refining Processes

Refiners worldwide have been shifting away from light, sweet crude oil feedstocks to heavier, sour grades. This transition reflects the diminishing supplies of lighter crude, which over time will result in attractive price differentials between heavy, sour crude and higher-quality crude.

The proportion of light, sweet conventional crude oil production in western Canada has declined from 51 percent in 1985 to 39 percent in 1992. This decline has been offset by increased production of non-conventional crude (i.e. synthetic crude manufactured from oil sands production) and condensate. The quality of crude produced in western Canada is forecast to remain fairly constant to the year 2000, with about 55 percent expected to be light, sweet (conventional and non-conventional) crude.

Reduction in Canadian light sweet crude production is offset by synthetic crude

**Canadian refineries are
largely built to run light
sweet crude**

Most Canadian refineries were designed to run on light, sweet crude. Many therefore have difficulty processing heavy, sour crude and large volumes of non-conventional crude — both of which are expected over time to become more plentiful and economically attractive.

Complexity is the refinery characteristic that permits refiners to increase the ratio of product slate value to feedstock cost. Complexity is measured by the relative amount of equipment and resources used relative to a standard crude processing unit. An investment in a more complex refinery configuration will improve competitiveness if it increases margins by a greater amount than the added fixed cost.

**U.S. refineries can
handle cheap, heavy,
sour crude better than
Canadian refineries**

Canada and the United States have the two most complex refining industries in the world, as measured by their ability to produce high-value products from the same crude slate. Overall, Canadian and U.S. refinery complexities are approximately the same, with Canada's industry ahead in hydro cracking and catalytic cracking capabilities, and the American industry ahead in sour crude desulphurization and heavy crude residual upgrading capabilities. The U.S. refiners are therefore currently better positioned to process the heavier, more sour and cheaper crude.

Canadian refiners did not invest in the heavy, sour crude upgrading technology during the 1980s to the same extent as their American counterparts. The reason is that the differential between Canadian light and heavy crude oil prices was artificially set by the federal government rather than by international market forces. The administered (light/heavy) price differential was less than the open market spread, and too low to justify major facility investments. In contrast, the U.S. government did not administer crude prices, and market forces were therefore allowed to encourage U.S. refiners to invest in more complex refining technology.

Although investments to upgrade and desulphurize heavy crude were not made in the Canadian refineries, significant investments were made upstream of the refineries in the crude oil production sector. These included two heavy oil upgraders operated by Husky Oil and Co-Op—Newgrade, as well as synthetic crude production plants operated by Suncor and Syncrude that produce light, sweet crude from the Canadian oil sands. These facilities provide Canada with considerable crude upgrading potential. They will position Canadian refiners to successfully compete in the future as price spreads between heavy and light crude increase to the point where synthetic and upgraded crude become economically attractive feedstock options for them. Some investment will have to be made by the Canadian refineries in order to accommodate the synthetic crude. The need and timing of this investment will be determined essentially by market forces.

**Canada's crude upgrading
plants redress U.S.
advantage**

3.2 Retailing

Profitability

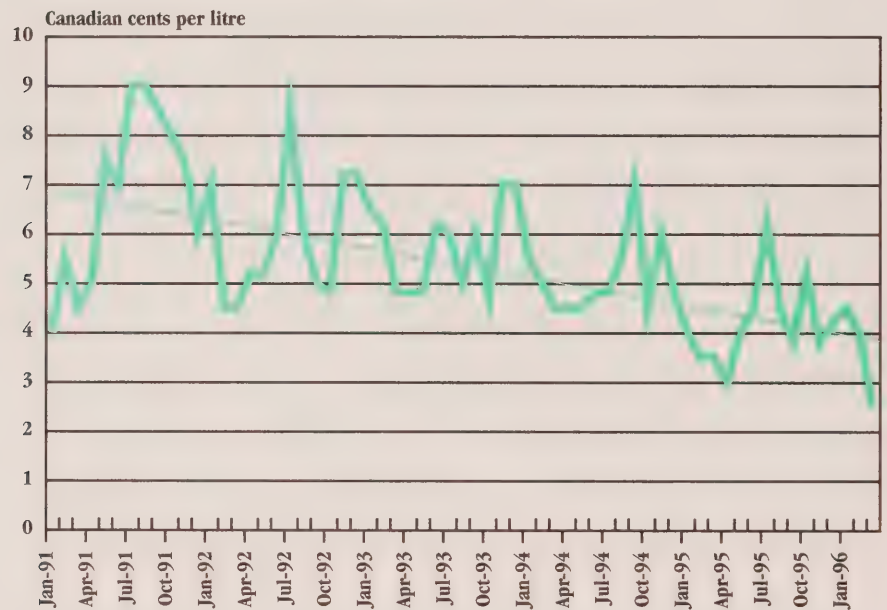
Retail margins at 4–5¢/L

have fallen more than

50% since 1980s

Retail margins, meaning the difference between the refinery gate price and product sales net of tax, include both the refiner-distributor's margin as well as the dealer's margin. Since 1991, retail margins have fluctuated sharply but generally reflected a declining trend (Figure 9).

Figure 9. Average Canadian Retail Margins (net of tax) for Regular Unleaded Gasoline



Source: Natural Resources Canada, Oil Division, 1996.

Because of Canada’s dispersed geography, the service station network in this country appears to be overbuilt. As an indication, the rate of service station utilization in the U.S. has outpaced that in Canada. The result is that American stations are twice as productive as Canadian stations. This allows for greater profitability because of significantly lower average unit costs.

Rationalization

The lower-volume, less efficient service stations have been closed in order to improve the productivity of the remaining stations. During the past 10 years, nearly 4000 service stations have been closed across the country. Despite these service station closures, marketing capacity remains high. The structure of this part of the industry, with some 44 percent of stations owned by independents, makes rapid rationalization beyond the control of major suppliers. Furthermore, many of these independents are small businesses that face the difficult challenge of choosing between continuing to operate an unprofitable service station or paying the high exit costs required for site restoration.

3000+ service stations
closed since 1990

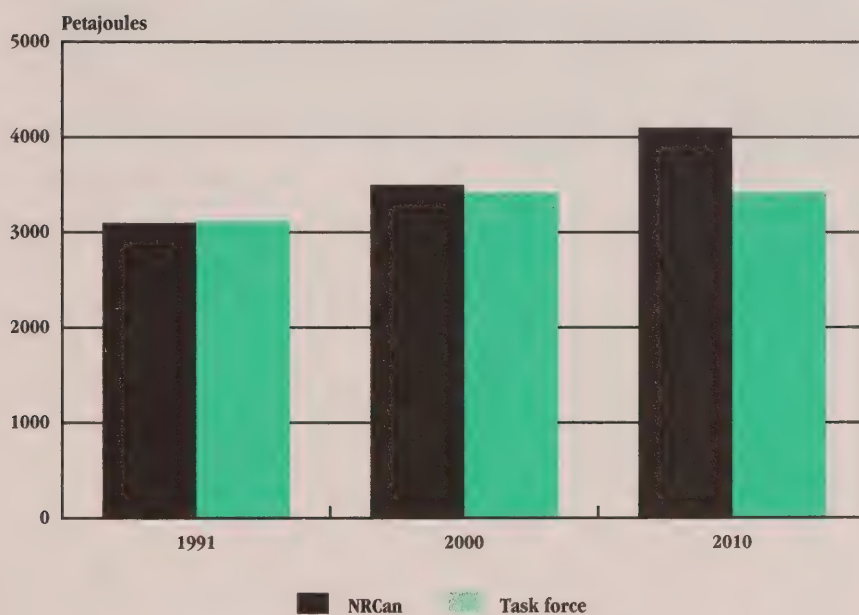
Service stations have expanded into ancillary goods and services to improve income

The number of people employed at service stations increased during the 1985–90 period from 86 000 to 113 000, even though the number of service stations declined from about 21 000 to 19 000. This situation occurred because operators expanded into non-fuel merchandising of ancillary goods and services (e.g. car washes and convenience stores) as a means of increasing revenues in the face of shrinking margins from gasoline sales. By 1995, however, further rationalization had reduced employment to just under 70 000 as the number of service stations dropped further to about 17 000 sites.

Product Demand

Forecasters are divided in their views of future product demand (Figure 10). Government forecasters (Natural Resources Canada, *Canada's Energy Outlook, 1992–2020*, October 1994) predict slow but steady growth in demand over the next two decades. Industry forecasters (Industry Canada, SCF Task Force, 1994) predict demand will remain virtually unchanged from its current level and then decline early in the next decade. These variances can be attributed primarily to assumptions of policy neutrality in the government forecasts.

Figure 10. Two Forecasts for Overall Petroleum Products Demand



Source: Industry Canada, *The Canadian Petroleum Refining and Marketing Industry, Sector Competitiveness Framework*, Vol. 2, Appendix A4, p. 8, 1994.

**Gasoline consumption
per vehicle drops 28%
(8% in U.S.)**

Relative to the United States, Canada has seen much greater decline in product demand since the 1980s. Specifically, U.S. demand increased by 11 percent between 1982 and 1992, while Canadian demand declined by 3 percent. In Canada, average gasoline consumption per vehicle declined by 28 percent, compared with a decline of only 8 percent in the U.S.

Contributing factors include the facts that:

**Gasoline tax in Canada
is higher**

- Canadian gasoline taxes increased by 18.7 cents per litre between 1980 and 1992, compared with tax increases of only 7.3 cents per litre in the U.S.
- Automobiles in Canada consumed approximately 200 litres less fuel for the same distances driven than in the U.S. in 1990. This can be at least partly explained by the fact that Canadians turn over their fleet of automobiles more quickly than Americans, which means that the Canadian fleet is newer and more fuel efficient.

**Canada's vehicle fleet
is more fuel efficient
than U.S. fleet**

Environmental Requirements

The retailing segment of the refining industry faces many pressures to restore contaminated sites to acceptable conditions for reuse in other businesses. However, the high costs associated with these site remediation activities have tended to discourage rationalization of service stations, and thus unprofitable service stations have continued to operate.

Site remediation costs
discourage rationalization
of service stations

Capital Investments

Investments in marketing and distribution grew during the mid and late 1980s. Facility upgrading, tank replacement programs and site clean-ups were the major areas of investment. Poor financial results and site rationalization programs have led to a reduction in expenditures since 1991. In 1994, capital expenditures in the marketing and distribution segment of the industry were just over \$400 million.

Capital expenditures in
marketing and distribution
reduce to \$400M in 1994

**Taxes make up more
than half of pump price**

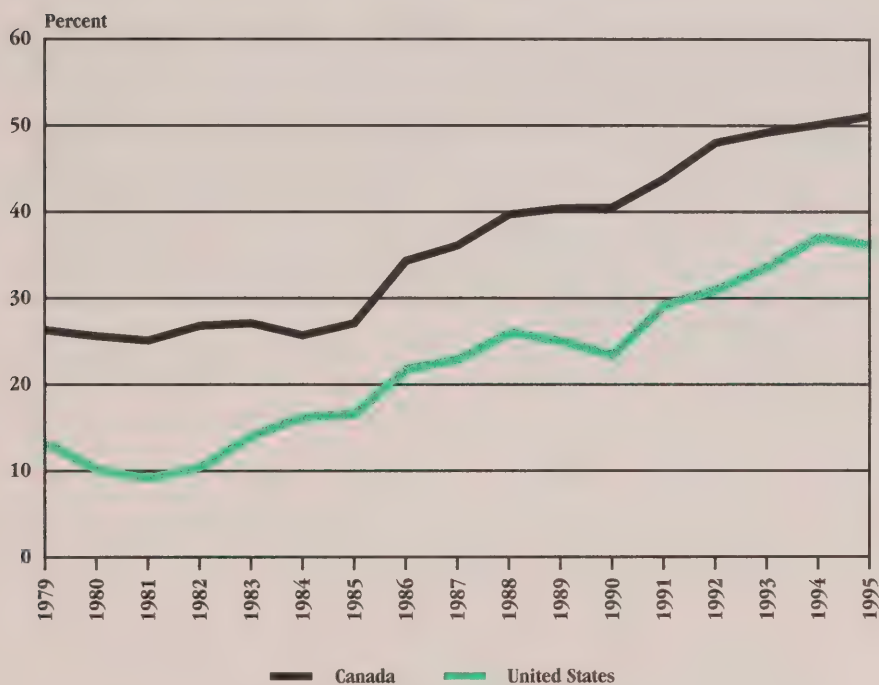
Taxation

Petroleum product sales are a major source of taxation revenue for governments. In 1980, federal and provincial taxes were 7.1 cents per litre; in 1995 this number had climbed to 28.0 cents per litre, an increase of almost 400 percent. Of the average retail price of 54.8 cents per litre for regular unleaded gasoline in Canada in 1995, over one half (28 cents per litre) was the tax component.

These high product taxes have helped reduce demand in recent years, although there is evidence that this effect is now levelling off. Subsidies for alternate fuels also can tip the balance in the market, driving down demand for gasoline and reducing margins.

American consumers have enjoyed lower gasoline prices than Canadians for over a decade, mainly because of higher taxation on gasoline in Canada (Figure 11). Other contributing factors include larger and more sophisticated (or complex) American refineries and greater economies of scale (as a result of serving 10 times the population) in the refining and distribution segments of the U.S. business.

Figure 11. Tax as a Percentage of Average Retail Prices for Regular Unleaded Gasoline



Source: Natural Resources Canada, Oil Division, 1996.

High taxes, combined with Canada's geographic proximity to the U.S., also contribute to several forms of tax fraud — mainly smuggling — and cross-border shopping.

4 GROWTH PROSPECTS

Although the industry anticipates little or no growth in overall demand for petroleum products over the next several years, a modest growth in diesel and aviation fuels is expected. There is also likely to be an attendant decline in demand for motor gasoline due to improved fuel efficiencies in the Canadian vehicle fleet.

The demand for crude and refined products has remained relatively steady among member countries of the Organisation for Economic Co-operation and Development for several years. Their economies have become less energy-intensive, and growth has slowed since the 1960s and 1970s. But energy demand, notably petroleum, continues to increase among newly industrialized countries, particularly in Asia.

4.1 Profitability

Refining

The industry must remain competitive in the global market by optimizing the utilization of its asset base and continuing its emphasis on cost control and rationalization. Ultimately, the industry must be prepared to deliver products that can compete with readily available imports.

The industry has already undergone major restructuring programs, necessitated by long-term declines in demand coupled with intense competition in the marketplace. Government policy initiatives that could facilitate this rationalization would be well received by the industry. Continued cooperation between government and industry is required to develop policies that aim at a reasonable balance between consumers' interest, industry competitiveness and viability, and environmental safety.

The rates of return given to regulated industries in Canada, particularly pipelines and electrical utilities, that impact upon the petroleum products industry's profitability, but whose costs cannot be controlled directly, may have to be reviewed for their competitive impact on the operating costs of the industry.

"Petroleum no longer possesses job-creating economic influence . . . so the industry must learn to be politically vigilant, entrepreneurial, aggressive and imaginative."

— Frank Dobbs, *Oilweek*

**New England could be
a new market**

Furthermore, given the variance in predictions of product demand, the different scenarios and assumptions used in developing these forecasts should be considered and understood before policy decisions are taken that could impact upon the demand.

In addition to other means to enhance profitability, the petroleum products sector could seek new markets and increase market expansion to the United States, for example, in New England.

**Ontario refiners want
Sarnia-to-Montreal
pipeline reversed**

Ontario refiners are at the end of the Interprovincial Pipe Line system, and are therefore vulnerable to higher acquisition costs for western Canadian crude. They are looking increasingly at the feasibility of reversing the Sarnia-to-Montreal pipeline (IPL Line 9) — i.e., from east to west — in the near future. This would allow greater flexibility for Ontario refineries to access imported crude, and would therefore provide Ontario with greater opportunity to access less expensive crude, be it domestic or foreign. The potential impacts of this decision — particularly with regard to the impact on Ontario refiners and western crude producers — must be carefully analyzed.

Retailing

Because retail margins on gasoline appear to be low, retailers consider alternate sources of income, such as car washes and convenience stores, to be necessary to maximize the use of assets and generate margins sufficient to ensure site viability. It might also be necessary to continue to reduce the number of unprofitable service stations. Given the costs associated with site remediation as well as the hesitation of station owners to undertake these activities, creative financing mechanisms must be developed to help businesses clean up and convert uneconomic sites to new uses where their value-added and contribution to the local economy can be enhanced.

The import option is important to independents, who are seeking lower costs to increase their margins. Similarly, the ability to negotiate lower rack prices (volume discounts) enhances margins.

**Retailers must sell more
than gasoline to survive**

**Unprofitable service
stations are discouraged
from closing by costs of
site remediation**

The wide gasoline price differential between Canada and the U.S., despite the geographic proximity of the two countries, has contributed to the problems of cross-border shopping and various forms of tax fraud, such as smuggling — activities that contribute to declining revenues and income. Continued partnership between government and industry is required to determine the potential impact of further tax increases and to develop measures to assess and minimize the impact of the above activities on Canadian retailers.

4.2 Environmental Issues

Expenditures for Environmental Initiatives

It is difficult to forecast the exact requirements and timing of future environmental programs for the industry. However, the Canadian Petroleum Products Institute (CPPI) and Environment Canada have developed an environmental scenario outlining the anticipated environmental requirements for the Canadian refining sector over the next two decades. It is estimated that annual expenditures for high-priority environmental initiatives alone could surpass \$1 billion by the year 2010, and that the inclusion of medium- and low-priority items could push this number upward to \$2.5 billion. These costs are expected to exceed the current book value of the industry.

**Annual expenditures on
environment could top
\$1B by 2010**

Paying for these environmental initiatives is a major concern, given the current low rates of return, the \$400 million already spent annually in capital expenditures in each of refinery and marketing, and industry expectations of flat demand. The challenge will be to develop a situation where the industry can recover incremental costs while the consumer continues to enjoy competitively priced, high-quality, environmentally safe products.

Reformulated Fuels

Among the most pressing environmental challenges for the industry over the next decade concerns the need to produce ever more environmentally friendly transportation fuels (i.e. reformulated gasoline and diesel fuels). Even though technology exists for producing highly reformulated fuels, the investment costs are extremely high, and the health and environmental benefits must be carefully weighed against these costs to ensure cost effectiveness.

**Environmentally friendly
fuels cost more**

**Petroleum and auto
industries need to
work together**

The challenge also exists to continue to respond to technological changes in the automotive industry. These changes require compatibility between transportation fuels and vehicle engine technology. Significant improvements in engine performance and emission levels have been made over the past 20 years. For example, carbon monoxide (CO) and hydrocarbon (HC) levels are down by 96 percent, and nitrogen oxide (NO_x) levels are down by 76 percent. Nevertheless, there is more scope for improvements through joint efforts between the two industries.

Environmental regulations on product quality will increase the costs of many products, including gasoline and desulphurized diesel, and potentially change product yields and the product itself. This typically happens, for example, when regular unleaded gasoline becomes a higher-cost/priced, reformulated gasoline.

Global Climate Change

In response to climate change agreements made during the 1992 “Earth Summit” in Rio de Janeiro, Brazil, the petroleum products industry has been examining different measures to maintain greenhouse gas emissions at their 1990 levels by the year 2000. Some initiatives under consideration are fuel efficiency targets, reformulated gasolines and vehicle scrappage programs for older vehicles. Any measures taken must first be carefully assessed to avoid excessive costs that could damage economic development while not providing real solutions.

All CPPI member companies are committed to the Voluntary Challenge and Registry program to increase energy efficiency and reduce greenhouse gas emissions.

Industry balances

environmental costs

against global imperatives

“Even though Canada is a marginal contributor to overall global emissions, CPPI has volunteered to contribute [an] aggressive energy program and further reduce our energy demands annually by 1% through the year 2000.”

**— Alain Perez, President,
Canadian Petroleum
Products Institute**

**A national fuel quality
standard would protect
refiners and environment**

National Fuel Standards

Canadian firms could find their competitive position strengthened through the development of Canadian national fuel quality standards that recognize the need for regional variation. A national and simplified regulatory regime would achieve environmental objectives and eliminate the incentive to import products having inferior environmental characteristics.

Joint Environmental Priority Setting

Joint environmental priority setting between government and industry should be undertaken to ensure that environmental issues are managed in a planned, orderly way based on scientific facts, allowing the industry to strengthen its competitiveness and financial health.

4.3 The Bottom Line

The Canadian petroleum products industry operates in an environment in which demand is not expected to change, but capital expenditures will continue to increase — particularly for environmental initiatives and new technologies. Despite this, industry profitability must be maintained. The most important and urgent issues for the industry are the environmental agenda and its impact on profitability, the ability of Ontario refiners to access economically more attractive crude slates (i.e. the reversal of IPL Line 9) and the need to significantly improve the viability of the retail and distribution system.

Joint dialogue and cooperation between government, industry and consumers will be crucial to dealing with the challenges facing the industry and its future viability.

**Demand flattens,
capital expenditures
rise, profitability drives
the industry**

This Sector Competitiveness Frameworks document on *Petroleum Products: Part 1 — Overview and Prospects* has been prepared as a basis for further discussion of issues and resolutions with key stakeholders. The outcome of the discussions will be published in *Part 2 — Framework for Action*.

For further information concerning the subject matter contained in this Overview, please contact:

Manufacturing and Processing Technologies Branch

Industry Canada

Attention: Jack Belletrutti

235 Queen Street

OTTAWA, Ontario

K1A 0H5

Tel.: (613) 941-6219

Fax: (613) 941-2463

E-mail: belletrutti.jack@ic.gc.ca

